Claims

Please amend the claims according to the status designations in the following list with the text of all active claims. This listing of claims will replace all prior versions of listings of claims in the application.

1. (Currently amended) A diffractive modulating element for modulating and diffracting an incident wave, comprising

   a) a first plate assembly, the first plate assembly comprising a first zone plate with a set of alternate zones being reflective and the remaining zones being transmissive to the incident wave, wherein the zone plate being a Fresnel zone plate consisting of a series of concentric circular zones with the width of the zones not equal to each other and the radii Rn of the zones determined by the zone plate equation;

   b) a second plate assembly, the second plate assembly comprising a second reflective zone plate complementary to said first zone plate, the second plate assembly being positioned substantially parallel to said first plate assembly, and the second plate assembly receiving the incident wave after the first plate assembly, wherein the zone

plate being a Fresnel zone plate consisting of a series of concentric circular zones with the width of the zones not equal to each other and the radii Rn of the zones determined by the zone plate equation;

c) displacing means for changing the relative distance between the first and second plate assemblies in a direction normal to the assemblies;

whereby the displacing means changes the relative distance between the first and second zone plates, and between a first configuration wherein the relative distance is *m* /2 times the wavelength of the incident wave, *m* is an integer number, the first and second zone plates act to reflect the incident wave as a plane mirror, and a second configuration wherein the relative distance is *m* /2 + 1/4 times the wavelength of the incident wave, the first and second zone plates act to diffract the incident wave into a series of focal points along the axis of the zone plates as a phase zone plate.

2. (Cancelled)

3. (Cancelled)

4. (Original) The element of claim 1, wherein said incident wave is a wave selected from the group consisting of electromagnetic waves, matter waves, and acoustic waves.
5. (Original) The element of claim 1, wherein one of the first and second plate assemblies is a movable plate assembly and the other is a stationary assembly, and further comprises a substrate and a first supporting means for supporting the movable plate assembly.
6. (Original) The element of claim 5, wherein said displacing means comprises means for applying an electrostatic force generated by a voltage source to the movable plate assembly.
7. (Original) The element of claim 5, wherein said first supporting means comprises a plurality of linkages, a plurality of deformable resilient beams, and a plurality of posts, whereby said linkages connect said movable plate assembly to said deformable resilient beams and said posts anchor said deformable resilient beams to said substrate.
8. (Cancelled)
9. (Cancelled)
10. (Currently amended) The element of claim 7, wherein said movable plate assembly is said second plate assembly, and said stationary plate

assembly is said first ~~zone~~ plate assembly, and further comprises a second supporting means for supporting the stationary plate assembly above the movable plate assembly.

11. (Cancelled)

12. (Original) The element of claim 5, wherein said substrate is a transparent substrate, and wherein said movable plate assembly is said second plate assembly and said stationary plate assembly is said first plate assembly and is affixed onto said transparent substrate, therefore the first plate assembly receives the incident wave from the transparent substrate side.

13. (Previously amended) The element of claim 12, further comprising a top cover structure, the top cover structure comprising a semiconductor substrate being coupled to said transparent substrate by an assembling means.

14. (Currently amended) A method of modulating an incident wave, comprising

    a) forming a first plate assembly, the first plate assembly comprising a first zone plate with a set of alternate zones being reflective and the remaining zones being transmissive to the incident wave, <u>wherein</u>

the zone plate being a Fresnel zone plate consisting of a series of concentric circular zones with the width of the zones not equal to each other and the radii Rn of the zones determined by the zone plate equation;

b) forming a second plate assembly, the second plate assembly comprising a second reflective zone plate complementary to said first zone plate, the second plate assembly being positioned substantially parallel to said first plate assembly, and the second plate assembly receiving the incident wave after the first plate assembly, wherein the zone plate being a Fresnel zone plate consisting of a series of concentric circular zones with the width of the zones not equal to each other and the radii Rn of the zones determined by the zone plate equation;

c) changing the relative distance between said first and second plate assemblies in a direction normal to the assemblies.

15. (Original) A method of claim 14, wherein in a first configuration the relative distance between said first and second plate assemblies is *m* /2 times the wavelength of the incident wave, *m* is an integer number, the first and second zone plates act to reflect the incident wave as a plane

mirror, and in a second configuration the relative distance is *m* /2 + 1/4 times the wavelength of the incident wave, the first and second zone plates act to diffract the incident wave into a series of focal points along the axis of the zone plates as a phase zone plate.

16. (Original) A method of claim 14, wherein one of said plate assemblies is caused to move relative to the other by applying electrostatic forces to at least one of said plate assemblies.

17. (Currently amended) A diffractive modulating device, comprising a substrate and a plurality of regularly arranged individual diffractive modulating elements for modulating an incident wave, each of the diffractive modulating elements comprising:

a) a first plate assembly, the first plate assembly comprising a first zone plate with a set of alternate zones being reflective and the remaining zones being transmissive to the incident wave, <u>wherein the zone plate being a Fresnel zone plate consisting of a series of concentric circular zones with the width of the zones not equal to each other and the radii Rn of the zones determined by the zone plate equation</u>;

b) a second plate assembly, the second plate assembly comprising a second reflective zone plate complementary to said first zone plate, the second plate assembly being positioned substantially parallel to said first plate assembly, and the second plate assembly receiving the incident wave after the first plate assembly, wherein the zone plate being a Fresnel zone plate consisting of a series of concentric circular zones with the width of the zones not equal to each other and the radii Rn of the zones determined by the zone plate equation; and

c) displacing means for changing the relative distance between the first and second plate assemblies in a direction normal to the assemblies.

18. (Cancelled)

19. (Cancelled)

20. (Original) The device of claim 17, wherein said incident wave is a wave selected from the group consisting of electromagnetic waves, matter waves, and acoustic waves.

21. (Cancelled)

22. (Original) The device of claim 17, wherein one of the first and second plate assemblies of each diffractive modulating element is a movable plate assembly.

23. (Original) The device of claim 22, wherein said displacing means of each diffractive modulating element comprises means for applying an electrostatic force generated by a voltage source to said movable plate assembly.

24. (Original) The device of claim 22, wherein each diffractive element further comprising a supporting means for supporting the movable plate assembly.

25. (Original) The device of claim 24, wherein said supporting means of each diffractive modulating elements comprises a plurality of linkages, a plurality of deformable resilient beams, and a plurality of posts, whereby the linkages connect said movable plate assembly to said deformable resilient beams and said posts anchor said deformable resilient beams to said substrate.

26. (Original) The device of claim 22, wherein said substrate is a transparent substrate, and wherein said movable plate assembly of each diffractive modulating element is said second plate assembly, and said

stationary plate assembly of each diffractive modulating element is said first plate assembly and is affixed onto said transparent substrate, therefore the first plate assembly receives the incident wave from the transparent substrate side.

27. (Previously amended) The device of claim 26, further comprising a top cover structure, the top cover structure comprising a semiconductor die being coupled to said transparent substrate by an assembling means.
28. (Currently amended) The device of claim 17, wherein said diffractive modulating elements are arranged as ~~an~~ a one-dimensional array.
29. (Original) The device of claim 17, wherein said diffractive modulating elements are arranged as a two-dimensional array on a square grid.
30. (Cancelled)
31. (Cancelled)
32. (Cancelled)
33. (Cancelled)
34. (Cancelled)
35. (Cancelled)
36. (Cancelled).
37. (Cancelled)

38. (Cancelled).

39. (Cancelled)

40. (Cancelled)

41. (Cancelled)

42. (Cancelled)

43. (Cancelled)

44. (Cancelled).

45. (Cancelled)

46. (Cancelled)

47. (Cancelled).